



POLAR STAR MINE TUNNEL

U.S. ENVIRONMENTAL PROTECTION AGENCY • REGION 9 • SAN FRANCISCO, CA • APRIL 2000

U.S. EPA REMOVAL ACTION FIELD WORK TO START IN MAY

The United States Environmental Protection Agency's (EPA) Emergency Response Office will begin work this month in preparation for the removal of mercury contaminated gravels and sluice box wood from the Polar Star Mine (PSM) tunnel.

The Polar Star Mine is an abandoned placer gold mine where hydraulic techniques were used to transport water and gravels through the tunnel which contains a sluice box. Individuals are potentially at risk for mercury exposure if they improperly handle or process the gravels and/or wood from the sluice box (see page 3 for additional information on mercury). Removing the mercury-contaminated gravels and sluice box from the PSM tunnel will prevent potential exposure due to mishandling of these materials. Past attempts by the property owner to secure the PSM site have been unsuccessful, and there are documented incidents of individuals trespassing onto the site to remove both mercury contaminated gravels and sluice box wood.

A secondary benefit of this removal action will be the elimination of one source of mercury and methylmercury loading to the Bear River. Water discharges from the PSM tunnel transport mercury and methylmercury into the Bear River, which could contaminate fish or shellfish that could be consumed by humans or wildlife.

The PSM tunnel is located near Dutch Flat, CA in Placer County, approximately 30 miles northeast of Auburn, CA. The site is in the northern section of the historic hydraulic mining area known as Nichols Diggings in the Dutch Flat Mining District.

Contractors under the supervision of the EPA will begin to bring equipment to the site in late April in preparation for the field work, which is expected to begin in May, depending on

weather conditions. The contractors will carry out the following tasks to complete the removal action:

- ◆ Develop a comprehensive site safety plan for all activities at the PSM site, including site security, before the start of any removal action work.
- ◆ Inspect the PSM tunnel and implement recommendations regarding tunnel stability, ventilation, and safety.
- ◆ Contain the groundwater flowing through the tunnel prior to the start of field work. Samples of the water will be analyzed to determine if the water can be safely disposed of on-site without treatment or whether treatment is required. The EPA has requested input from the California Regional Water Quality Control Board regarding criteria that would require treatment.
- ◆ Excavate and remove the wooden sluice box and boulders from the PSM tunnel. Wood debris

will be analyzed and properly disposed; the boulders will be pressure washed and placed back in the tunnel.

- ◆ Remove the mercury contaminated gravels in the PSM tunnel. The gravels will be put through a process to physically separate the elemental mercury and amalgam from sediments.
- ◆ Arrange for transportation and disposal of any mercury contaminated gravels, also called "fines" that are too small to be recovered in the physical separation process.

The completion of the above tasks will take a minimum of eight weeks. Crews will usually work all daylight hours, including weekends. Crews will comply with regulations of the California Division of Occupational Safety and Health while working at the site and in the PSM tunnel. Workers will be required to complete additional training to work in the PSM tunnel and will wear protective clothing to prevent contact with the mercury contaminated gravels and sluice box wood.

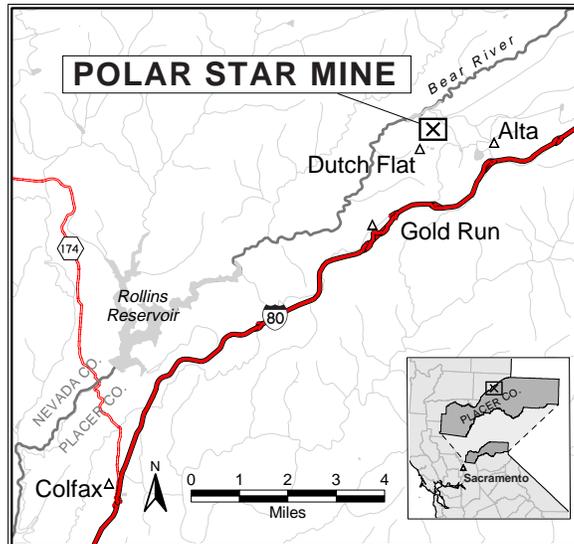


Figure 1: Site Location Map

Future Activities

The EPA is currently collecting information about the extent and concentrations of mercury in the larger historic hydraulic mining area known as Nichols Diggings to determine if additional work should be done.

The U.S. Geological Survey, the Bureau of Land Management, the U.S. Department of Agriculture (U.S. Forest Service), as well as state and local agencies are cooperating on detailed

studies of mercury distribution in relation to the numerous historic hydraulic mine sites in the Bear and Yuba River watersheds. The EPA is participating as a cooperating agency on these studies. For additional information on this project, contact Charles Alpers of the U.S. Geological Survey (USGS), at 916-278-3134 or visit the USGS web site at: <http://ca.water.usgs.gov/mercury/Bear-Yuba/> (site active late April 2000).

Site Background

The tunnel at the site was probably constructed relatively late in the operational period of the Polar Star Mine (late 1800s). The PSM tunnel, drilled and blasted through bedrock, acted as a main drain for the hydraulic pit at the site (see Figure 2). Gravels were hydraulically blasted from the pit wall and washed through surface ditches on the bottom of the pit to the tunnel sluice, which had been lined with boulder riffles or wood, and "charged" with mercury to enhance capture of the finer gold particles that would otherwise wash through the box. Gold combined with the mercury to form an amalgam, which was recovered, and then heated to drive off the mercury and separate the gold. It is estimated that as much as 30% of the mercury used in gold recovery processes was discharged with light sediments into surface waters. The annual loss of mercury from a typical sluice box was likely to have been several hundred pounds per year, or more. Levels of mercury in the range of 10,000-30,000 parts per trillion (ppt, or nanograms per liter), which is equal to 10-30 parts per billion (ppb, or micrograms per liter), have been detected at the tunnel discharge following periods of disturbance within the PSM tunnel.

The PSM tunnel is approximately 480 feet long and 10 feet in diameter. The sluice box, which measures 4 feet x 2 feet, is mostly intact and runs along the floor of the entire PSM tunnel. The downstream end of the PSM tunnel opens out to a steep slope a few hundred feet above the Dutch Flat Afterbay on the Bear River.

Today, there are many areas in the Sierra foothills of California with intact sluice boxes, sluice box remnants, and drainage tunnel sediments, some with high levels of mercury (up to 30,000 milligrams per kilogram or parts per million, ppm, equivalent to 3 weight percent). It is common for sediments from these areas and wood from the sluice boxes (which may contain mercury) to be taken from both private and public property in the area by recreational or "weekend" gold miners. Individuals are potentially at risk for mercury exposure if they improperly handle or process the sediments or wood from the sluice boxes. In 1999, two people in Fresno, CA died when, in an attempt to recover gold, they heated a mercury-gold mixture on the stove in their house causing the mercury to vaporize. Mercury vapors are one of the most dangerous forms of the element (see page 3 for additional information on mercury).

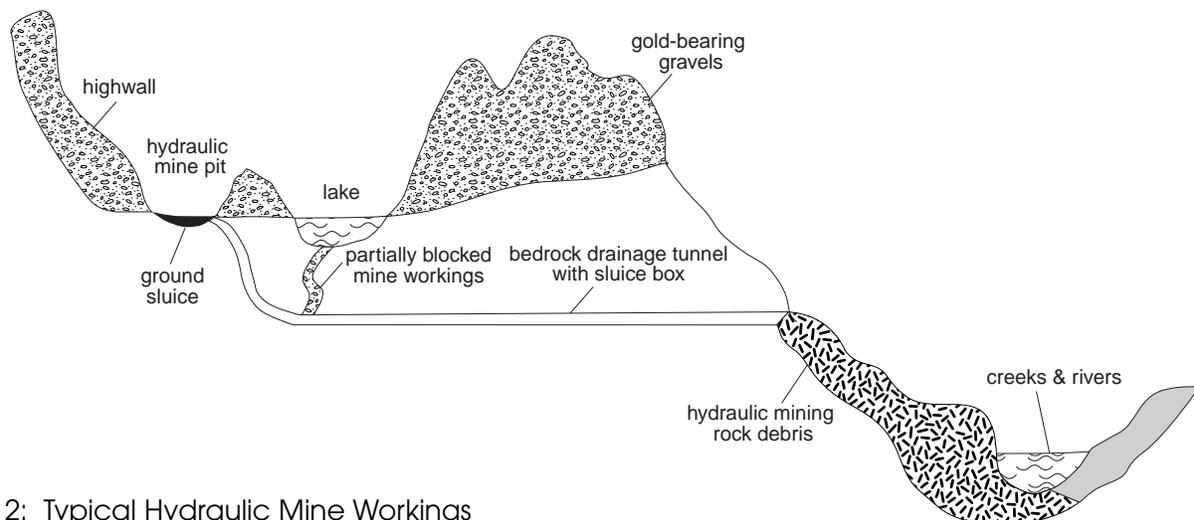


Figure 2: Typical Hydraulic Mine Workings

Adapted from U.S. Geological Survey figure

Mailing List Coupon

If you did not receive this fact sheet in the mail and would like to be included on the mailing list to receive future EPA mailings about the Polar Star Mine site, please fill out the coupon below and return to the address printed on the reverse side of this self-mailer. Please place a stamp as indicated, fold on the fold line (below), fasten with tape and drop into the mail.

Catherine McCracken, Community Involvement Specialist
U.S. Environmental Protection Agency Region 9
75 Hawthorne Street (SFD-3)
San Francisco, CA 94105



PLEASE PRINT ALL INFORMATION

NAME: _____

ADDRESS: _____

*PHONE: _____

*FAX: _____

*E-MAIL: _____

*ORGANIZATIONAL AFFILIATION: _____

(*Optional items) You may also provide the above information via e-mail to: mccracken.catherine@epa.gov, or via fax to (415) 744-1796.

Catherine McCracken, Community Involvement Specialist
U.S. Environmental Protection Agency Region 9
75 Hawthorne Street (SFD-3)
San Francisco, CA 94105

*Place
stamp
here.*

(Please fold on this line.)

(Please fasten with tape at this edge.)

Mercury Basics

Mercury is a naturally occurring metal which has several forms. Elemental mercury is a shiny, silver-white, odorless liquid. If heated, it transforms to a colorless, odorless gas. Mercury combines with other elements, such as chlorine, sulfur, or oxygen, to form inorganic (not carbon-containing) mercury compounds or "salts," which are usually white powders or crystals. Metallic mercury and inorganic mercury compounds enter the air from mining of mercury ore deposits, burning coal and waste, and from manufacturing plants.

Elemental mercury can be converted into the organic (carbon-containing) compound, methylmercury. This process, called methylation, is thought to be controlled by bacteria in sediments and water. More mercury in the environment can increase the levels of methylmercury that these bacteria make. Methylmercury can be taken up and retained by organisms, and tends to increase in concentration over time in some plants and animals. Methylmercury is the form of mercury that builds up in fish tissues. Larger and older fish tend to have the highest levels of mercury.

Exposure to mercury can occur from inhaling vapors in air, eating fish, shellfish or other food contaminated with methylmercury, drinking water that has high concentrations of mercury, release of mercury during dental and medical treatments, or skin contact with mercury.

A human's nervous system is very sensitive to all forms of mercury, although some forms of mercury are more harmful than others because of how the body handles them. Breathing mercury metal vapors, or breathing or ingesting methylmercury causes the most harm because more mercury in these forms reaches the brain. Short-term exposure to very high levels of metallic mercury vapors may cause lung damage, nausea, vomiting, diarrhea, increases in blood pressure or heart rate, skin rashes, and eye irritation, and can lead to coma or death.

Exposure to high levels of metallic, inorganic, or organic mercury can permanently damage the brain, kidneys, and developing fetus. Effects on brain functioning may result in irritability, shyness, tremors, changes in vision or hearing, and memory problems.

Very young children are more sensitive to mercury than adults. Mercury in the mother's body passes to the fetus and can pass to a nursing infant through breast milk. However, the benefits of breast feeding may be greater than the possible adverse effects of mercury in breast milk. Mercury's harmful effects that may be passed from the mother to the developing fetus include brain damage, mental retardation, incoordination, blindness, seizures, and an inability to speak. Children poisoned by mercury may develop problems with their nervous and digestive systems and kidney damage.

There are inadequate human cancer data available for all forms of mercury. Mercuric chloride has caused increases in several types of tumors in rats and mice, whereas methylmercury increased kidney tumors in male mice. The EPA has determined that mercuric chloride and methylmercury are possible human carcinogens.

Additional information about the EPA's work at the Polar Star Mine site is available for review at the locations listed below. The documents at these locations are part of the Administrative Record for the Polar Star Mine removal action.

U.S. EPA Superfund Records Center
95 Hawthorne Street, Suite 403S
San Francisco, CA 94105-3901
Telephone: 415-536-2000
Hours: Monday to Friday: 8:00 a.m. - 5:00 p.m.
Saturday & Sunday: Closed

Colfax Public Library
2 W. Church Street
Colfax, CA 95713
Telephone: 530-346-8211
Hours: Tuesday 1:00 - 7:00 p.m.
Wed. & Thurs: 1:00 - 5:00 p.m.
Fri. & Sat: 10:00 a.m. - 2:00 p.m.
Sunday & Monday: Closed



Additional information is available on the Internet:

EPA Emergency Response Program <http://www.epa.gov/superfund/programs/er/index.htm>
EPA Superfund Program <http://www.epa.gov/superfund>
EPA Region 9 Solid & Hazardous Waste Programs <http://www.epa.gov/region09/waste>
EPA Region 9 <http://www.epa.gov/region09>
EPA Headquarters <http://www.epa.gov>
EPA Office of Groundwater and Drinking Water fact sheet on mercury:
<http://www.epa.gov/ogwdw000/dwh/c-iocmercury.html>



Information on California fish consumption advisories and mercury is available on the **California Office of Environmental Health Hazard Assessment web site** at:

<http://www.oehha.ca.gov/fish/general/memerc.html>

For More Information

If you have questions or would like more information about the EPA's work at the Polar Star Mine site, please contact:

Christopher Weden, On-Scene Coordinator
Telephone: 415/744-2291

Catherine McCracken,
Community Involvement Specialist
Telephone: 415/744-2182

John Jaros, Investigator
Telephone: 415-744-2316

Media inquiries:
Leo Kay, Press Officer
Telephone: 415/744-2201

...or call the EPA's Office of Community Involvement
toll-free line at 1-800-231-3075.

Leave a message and your call will be returned.

Printed on 30% Postconsumer



Recycled/Recyclable Paper

U.S. Environmental Protection Agency, Region 9
75 Hawthorne Street (SFD-3)
San Francisco, CA 94105-3901
Attn: Catherine McCracken

Official Business
Penalty for Private Use, \$300
Address Correction Requested

FIRST-CLASS MAIL
POSTAGE & FEES PAID
U.S. EPA
Permit No. G-35